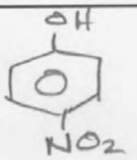
Vers 1 - 9:00 White

KEY

(2 pts. each, 20 total points)

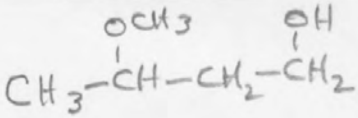
1. Draw the structure of the following compounds:

a) *p*-Nitrophenol



2 pts.

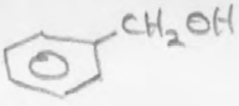
b) 3-methoxy-1-butanol



$CH_3-CH(OCH_3)-CH_2-CH_2OH$

2 pts.

c) benzyl alcohol



2 pts.

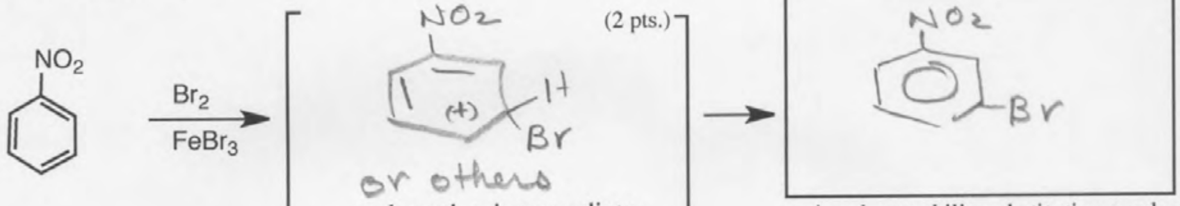
d) diethyl ether

$CH_3CH_2-O-CH_2CH_3$

2 pts.

2. Draw an appropriate structure in each box:

a)



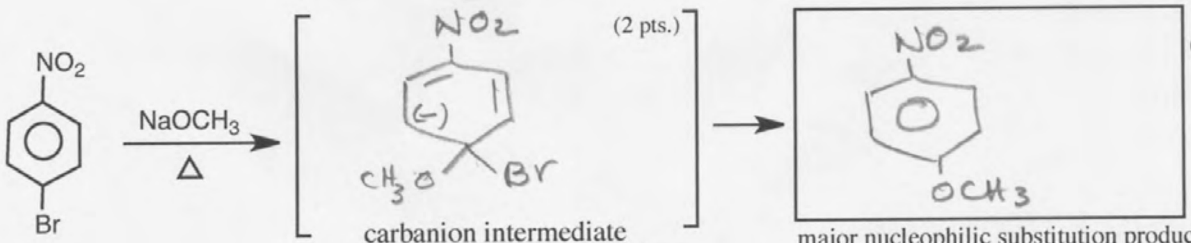
(2 pts.) (2 pts.)

or others

carbocation intermediate (one resonance structure)

major electrophilic substitution product

b)

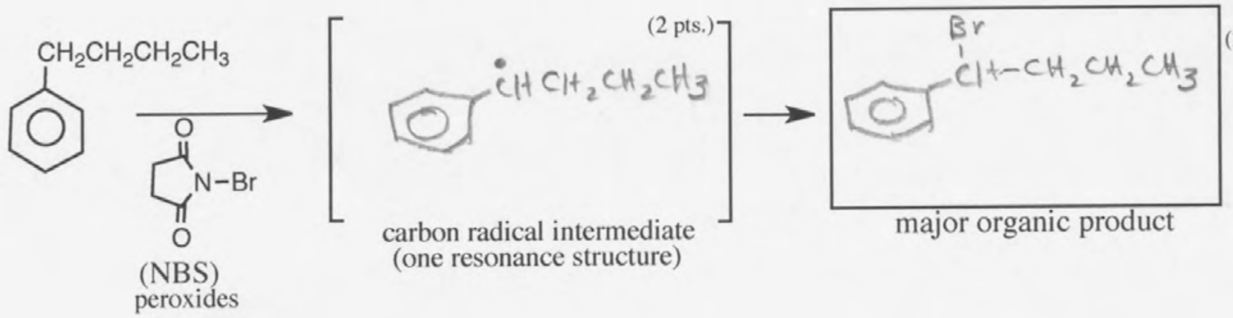


(2 pts.) (2 pts.)

carbanion intermediate (one resonance structure)

major nucleophilic substitution product

c)



(2 pts.) (2 pts.)

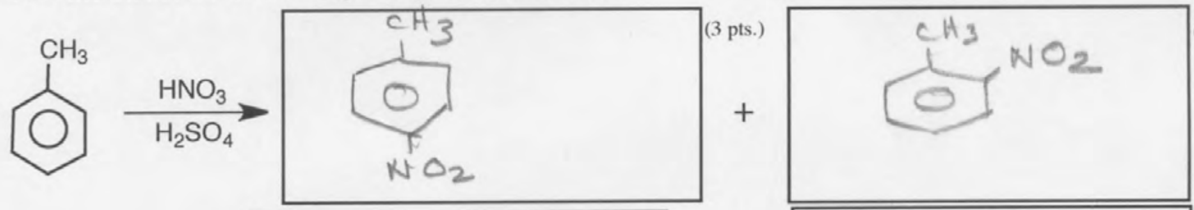
carbon radical intermediate (one resonance structure)

major organic product

(3 pts. each, 39 total points)

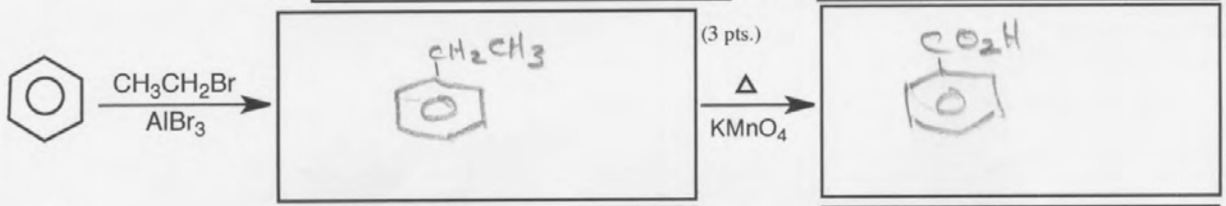
3. Draw the structure of the major organic product(s):

a)



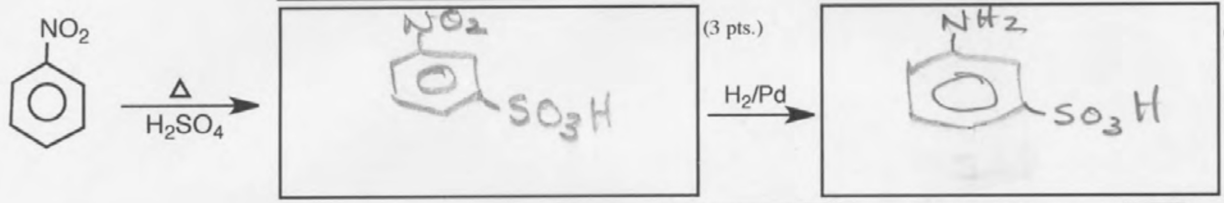
(3 pts.) (3 pts.)

b)



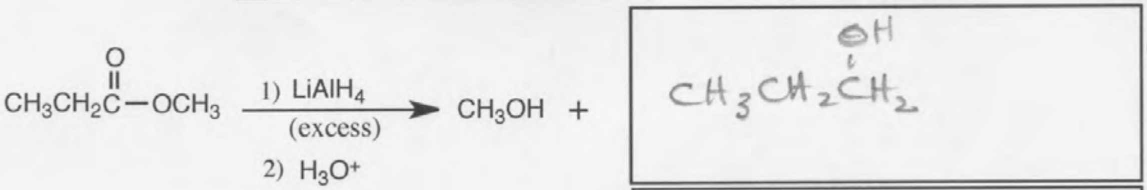
(3 pts.) (3 pts.)

c)



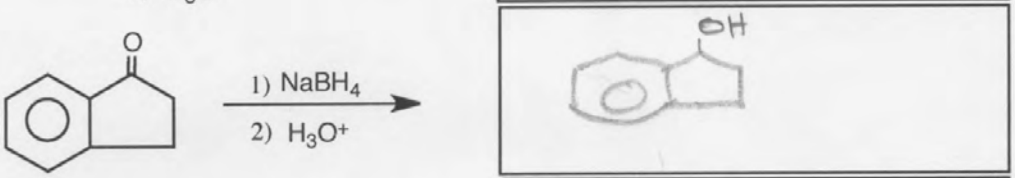
(3 pts.) (3 pts.)

d)



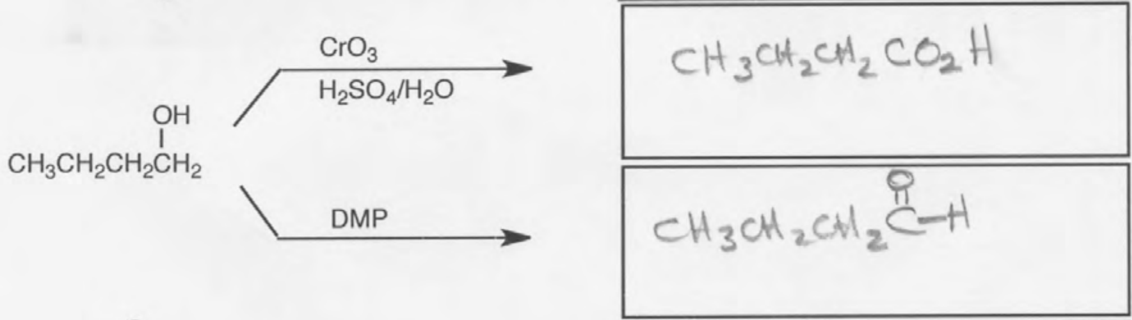
(3 pts.)

e)



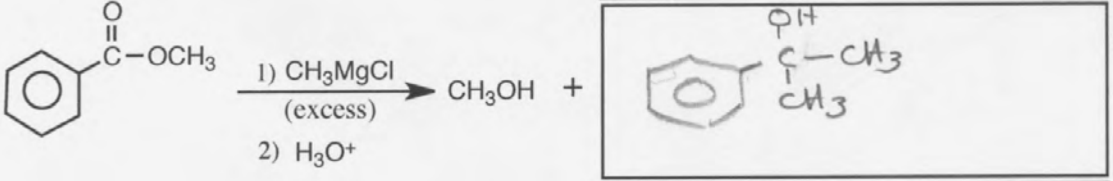
(3 pts.)

f)



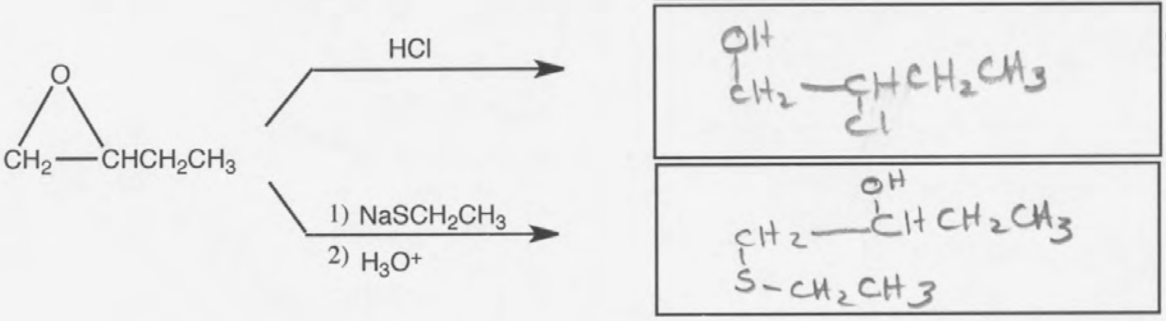
(3 pts.) (3 pts.)

g)



(3 pts.)

h)

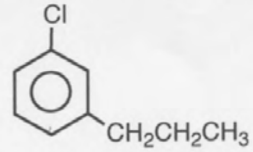
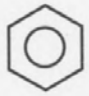


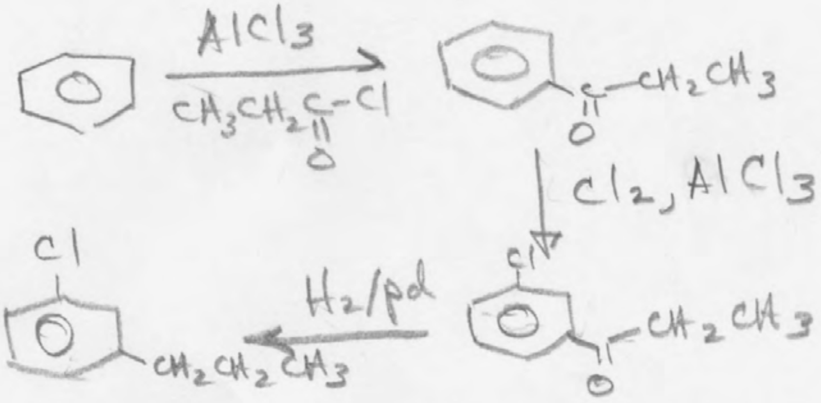
(3 pts.) (3 pts.)

(12 points total)

4. Outline the steps in an efficient synthesis:

(6 pts.)

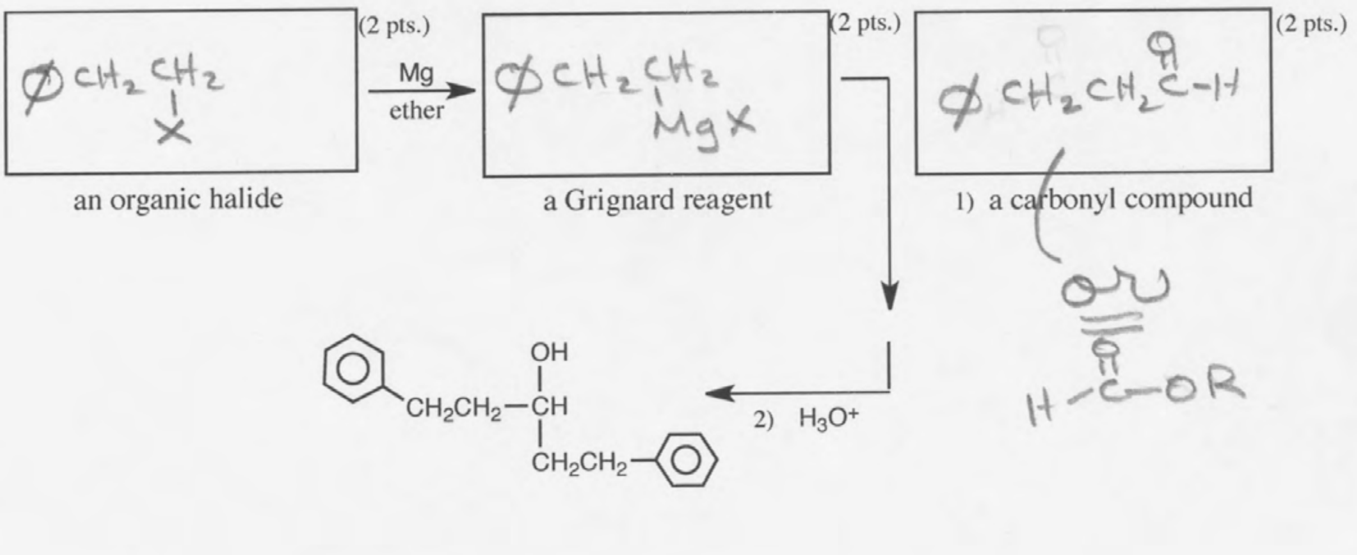
Make:  From:  and any other desired reagents



$AlCl_3$
$CH_3CH_2\overset{O}{C}-Cl$
$-\overset{O}{C}-CH_2CH_3$
$Cl_2, AlCl_3$
Cl
H_2/pd
$-\overset{O}{C}-CH_2CH_3$
Cl
$CH_2CH_2CH_3$

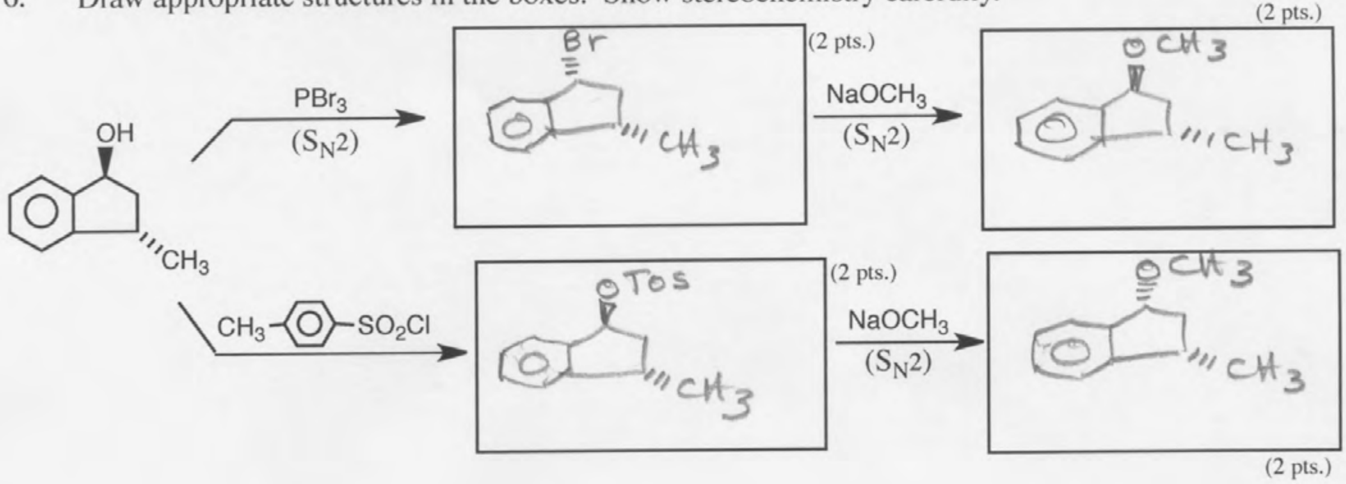
For partial credit - Give 2 pts for each correct step

5. (6 pts. total) Fill in the boxes to complete the following Grignard Synthesis:



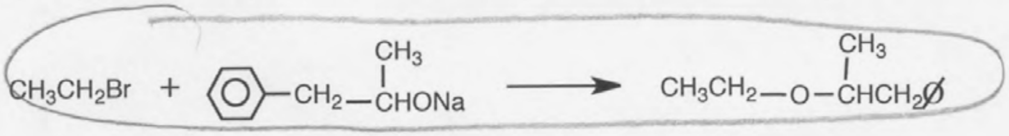
(14 points total)

6. Draw appropriate structures in the boxes. Show stereochemistry carefully.



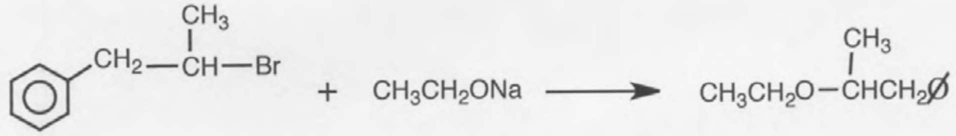
7 Encircle the Williamson ether synthesis (**a** or **b**) which will give the higher yield of the indicated product:

[✓ a)]

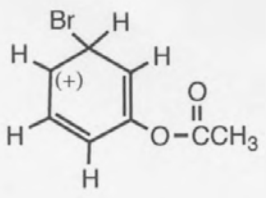


(2 pts.)

b)

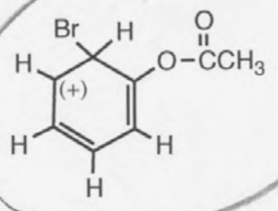


8. a) Encircle the more stable carbocation:



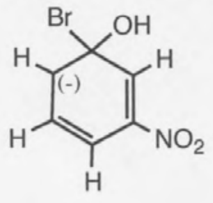
or

[✓]



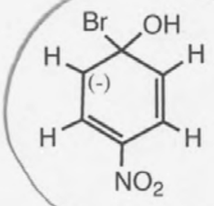
(2 pts.)

b) Encircle the more stable carbanion:



or

[✓]

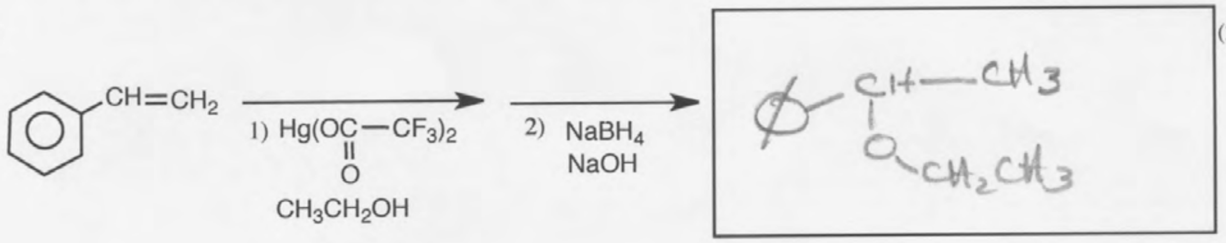


(2 pts.)

(15 total points)

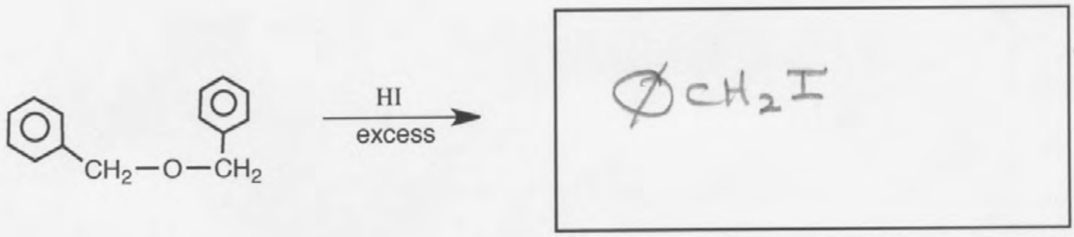
9. Draw structures in the boxes to complete the following reactions:

a)



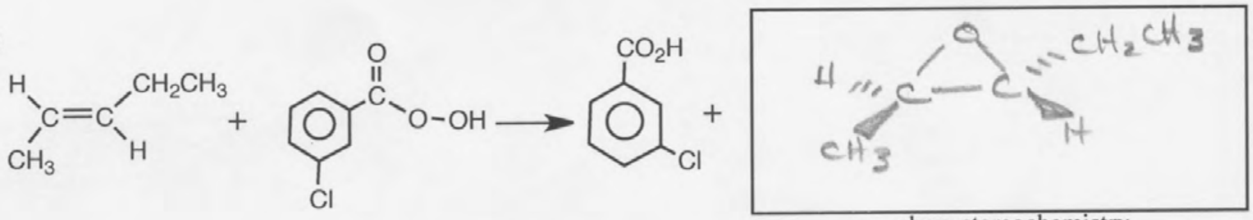
(2 pts.)

b)



(2 pts.)

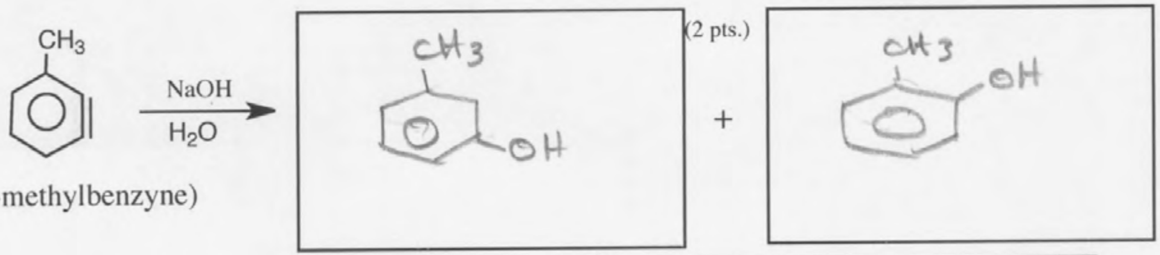
c)



show stereochemistry

(2 pts.)

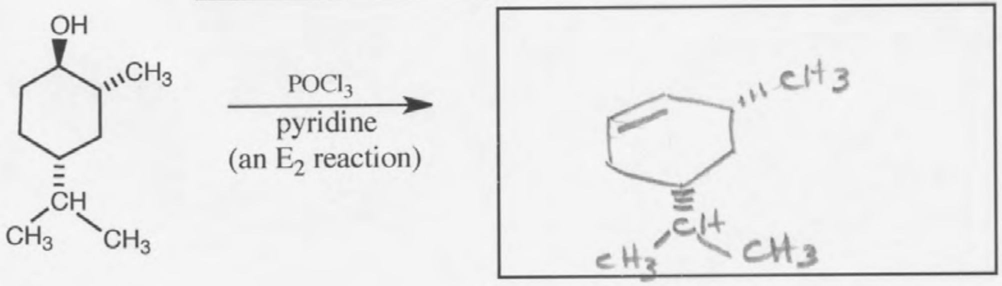
d)



(3-methylbenzyne)

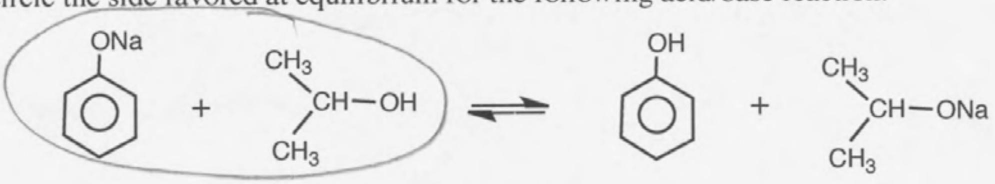
(2 pts.) (2 pts.)

e)



(2 pts.)

10. Encircle the side favored at equilibrium for the following acid/base reaction:



(3 pts.)